Ash Creek Associates, Inc.
Environmental and Geotechnical Consultants

November 29, 2011

Mr. Dwight Leisle
Port of Portland
7200 NE Airport Way
Portland, Oregon 97218

Re: Surface Soil Sampling Results — Operable Unit 2
Swan Island Upland Facility
Portland, Oregon
ECSI No. 271
1115-05

Dear Mr. Leisle:

This letter presents the results of surface soil sampling activities completed to support the preparation of an addendum to the *Source Control Evaluation* (SCE; April 15, 2010) for Operable Unit 2 (the Facility or OU2) at the Swan Island Upland Facility (SIUF) in Portland, Oregon (Figures 1 and 2). The Port of Portland (Port) is under a Voluntary Cleanup Program (VCP) Agreement with the Oregon Department of Environmental Quality (DEQ) for Remedial Investigation (RI), Source Control Measures (SCMs), and Feasibility Study (FS) at the Facility (dated July 24, 2006). The DEQ approved the Surface Soil Sampling Work Plan (dated December 27, 2010) in a letter dated February 1, 2011. The methods, procedures, and results of the chemical analyses are presented in this letter.

SAMPLING ACTIVITIES

Preparatory Activities

The following activities were completed in preparation for the field work.

- Health and Safety Plan (HASP). Ash Creek Associates (Ash Creek) prepared a HASP for its personnel involved with the project.
- Underground Utility Location. An underground utility locate was conducted by prior to the sampling activities.
- Work in Tenant Areas. The work activities were conducted in coordination with tenant schedules.

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Surface Soil Sampling

Historical Substation A. One four-point composite surface soil sample was collected below the platform beneath the area observed to have historically included the electrical equipment (Figure 3; Photograph 1, Attachment A). A second four-point composite surface soil sample was collected on the riverbank downslope of the platform (above the ordinary line of high water [OLHW]; Photographs 2 and 3). The sub-sample locations within each composite sample area were located at equally spaced distances in a staggered pattern. Discrete samples from each sub-sample location were collected and retained for potential future analysis. Surface soil was collected from a depth of 0 to 1 foot at the four discrete sub-sample locations within each of the composite sample areas. The samples were collected in accordance with Standard Operating Procedure (SOP) 2.2 (Attachment B). The samples were field screened for volatile organic compounds (VOCs) using a photoionization detector (PID) and for the presence of petroleum hydrocarbons using a sheen test in accordance with SOP 2.1 (Attachment B). No field indications of VOCs or petroleum hydrocarbons were observed.

The sample locations were recorded using a high-accuracy, handheld global positioning system (GPS) device (Trimble© GeoXH™).

Butyl Tin Ion Surface Soil Sampling. One composite surface soil sample was collected from inside a 100-foot radius surrounding the Daimler Lot catch basin on OU2 (Photograph 4) and analyzed for tributyltin (TBT). The discrete sample locations making the composite sample are shown on Figure 4. A Portland-cement concrete slab was encountered underlying the sampling area between 3 and 8 inches below the ground surface (bgs). Surface soil was collected from a depth of 0 to 6 inches at the four discrete sub-sample locations where the concrete slab was deep enough (Figure 4). The samples were collected in accordance with SOP 2.2 with the following modification: Prior to placement of samples into the sample container, soil was passed through a No. 4 sieve to remove gravel-size particles. The material passed through the sieve was estimated to be approximately 30 percent by volume. Discrete samples from each sub-sample location were also collected and retained for potential future analysis. The samples were field screened for VOCs using a PID and for the presence of petroleum hydrocarbons using a sheen test in accordance with SOP 2.1. No field indications of VOCs or petroleum hydrocarbons were observed.

The sample locations were recorded using a high-accuracy, handheld global positioning system GPS device.

ANALYTICAL RESULTS

The soil samples collected from the above activities were submitted to Pace Analytical Services, Inc. in Seattle, Washington for chemical analysis. Copies of the laboratory reports are included in Attachment C (in CD-Rom format due to the length of the Level III deliverable report). The samples were analyzed on a standard turnaround time (up to 10 business days). A quality assurance review of the data was completed. No qualifiers were attached to the data as a result of our review.

Historical Substation A

The composite samples were analyzed for the following and the discrete samples were held for potential follow-up analyses (Table 1).

- Diesel and oil-range TPH by Northwest Method NWTPH-Dx (with silica gel cleanup); and
- Polychlorinated biphenyls (PCBs) by EPA Method 8082 (Aroclors 1016, 1221, 1232, 1242, 1248, 1254, 1260, 1262, and 1268).

Estimated concentrations of TPH as diesel and oil were reported in the composite sample from under the platform (Sub A - 2011 [Comp A]). Aroclor 1260 was detected at a concentration of 24.8 μg/kg, below the screening criteria of 200 µg/kg but above the DEQ's bioaccumulative sediment SLV of 0.39 µg/kg. TPH and PCB aroclors were not detected above the method reporting limit (MRL) in the sample collected on the river side of the platform.

Butyl Tin Ion Surface Soil Sampling

The composite sample was submitted for analysis of the following and the discrete samples were held for potential follow-up analyses (Table 2).

- Butyl tin ions by the Krone Method.

The DEQ-approved plan indicated that if a target analyte is reported in a composite sample at 25 percent or more of the noted screening level the discrete samples from that composite will be analyzed. Tributyltin (TBT) was detected in the composite sample at a concentration of 61 µg/kg (versus the screening level of 2.4 µg/kg). Consequently, the discrete samples were analyzed for butyltin ions. TBT was detected between 79 and 640 µg/kg in three of the four discrete samples. Dibutyltin and butyltin ions were also detected.

CONCLUSIONS

These data will be incorporated in the addendum to the *Source Control Evaluation.*

If you have any questions regarding these activities, please contact the undersigned at (503) 924-4704.

Sincerely,

Michael J. Pickering, R.G.
Associate Hydrogeologist

ATTACHMENTS

Table 1 – Soil Analytical Results: Historical Substation A
Table 2 – Soil Analytical Results: Daimler Parking Lot Catch Basin

Figure 1 – Facility Location Map
Figure 2 – Facility Vicinity Map
Figure 3 – Sampling Plan – Substation A
Figure 4 – Sampling Plan – Catch Basin

Attachment A – Photograph Log
Attachment B – Standard Operating Procedures 2.1 and 2.2
Attachment C – Laboratory Analytical Report (CD-Rom)

Table 1
Soil Analytical Results: Historical Substation A
Swan Island Upland Facility
Portland, Oregon

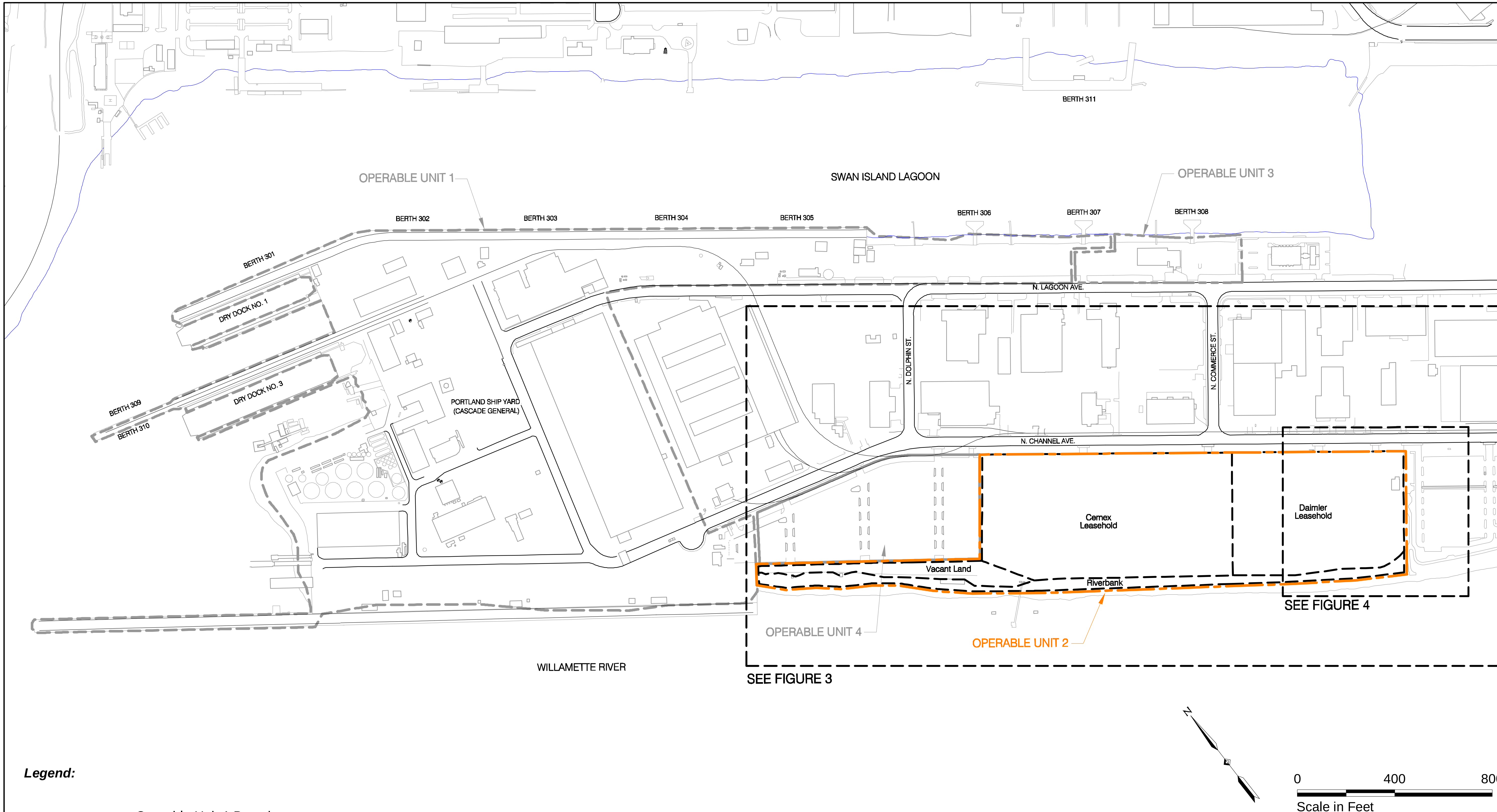
	Under Platform	River Side of Platform	
Sample Number	Sub A - 2011 (Comp A)	Sub A - 2011 - (Comp B)	
Sampling Interval (inches)	0 to 12	0 to 12	
Sample Date	2/16/2011	2/16/2011	JSCS
NWTPH-Dx (silica gel; mg/kg)			
Diesel-Range	5.2 J	<3.8	--
Residual-Range	31.5 J	<25.4	--
PCB Aroclors by EPA 8082 (µg/kg)			
Aroclor 1016	<5.5	<5.8	530
Aroclor 1221	<2.8	<2.9	--
Aroclor 1232	<3.8	<4.0	--
Aroclor 1242	<5.1	<5.3	--
Aroclor 1248	<4.9	<5.1	1,500
Aroclor 1254	<2.9	<3.1	300
Aroclor 1260	24.8	<6.2	200
Aroclor 1262	<3.5	<3.6	--
Aroclor 1268	<1.6	<1.7	--
Total PCBs	24.8	<6.2	0.39

Notes:
1. µg/kg = microgram per kilogram (parts per billion [ppb])
2. mg/kg = milligram per kilogram (parts per million [ppm]).
3. < = Not detected above the method reporting limit
4. JSCS = Screening levels from Portland Harbor Joint Source Control Strategy – Final (Table 3-1 Updated July 16, 2007). December 2005
5. -- = Not available or not applicable.
6. J = Estimated.
7. Shading notes reported concentrations above the screening level

Table 2
Soil Analytical Results: Daimler Parking Lot Catch Basin
Swan Island Upland Facility
Portland, Oregon

	Composite	Discrete Samples				
Sample Number	Daimler Lot (Composite)	Daimler Lot-A1	Daimler Lot-A2	Daimler Lot-A3	Daimler Lot-A4	
Sampling Interval (inches)	0 to 6	0 to 6	0 to 6	0 to 6	0 to 6	
Sample Date	2/16/2011	2/16/2011	2/16/2011	2/16/2011	2/16/2011	JSCS
Butyl Tin Ions by Krones Method (µg/kg)						
Tributyltin Ion	61	79	<3.5	640	620	2.4
Dibutyltin Ion	21	12	<5.2	62	83	--
Butyltin Ion	20	5.3	<3.7	19	20	--
Tetrabutyltin	<4.2	<4.5	<4.6	<23	<22	--

Notes:
1. µg/kg = microgram per kilogram (parts per billion [ppb]).
2. < = Not detected above the method reporting limit.
3. JSCS = Screening levels from Portland Harbor Joint Source Control Strategy – Final (Table 3-1 Updated July 16, 2007). December 2005.
4. -- = Not available or not applicable.
5. **Bold** = Exceeds screening level.



Legend:

- Operable Unit 1 Boundary
- Operable Unit 2 Boundary
- Operable Unit 3 Boundary
- Operable Unit 4 Boundary
- Exposure Area and Designation

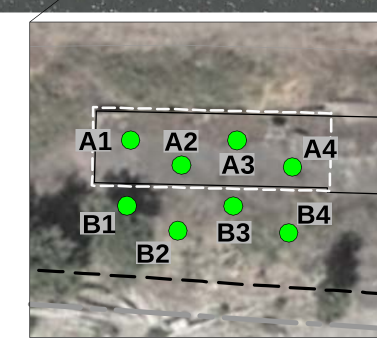
NOTE:
1. Prepared from AutoCAD base map received from the Port of Portland in June 2007.

Facility Vicinity Plan

Surface Soil Sampling Letter
Swan Island Upland Facility Operable Unit 2
Portland, Oregon

Ash Creek Associates, Inc.
Environmental and Geotechnical Consultants

Project Number	1115-05	Figure
March 2011		2



1" = 50'

N

0 100 200

Scale in Feet

Legend:

A1 ● Proposed Discrete Sample Location

NOTES:

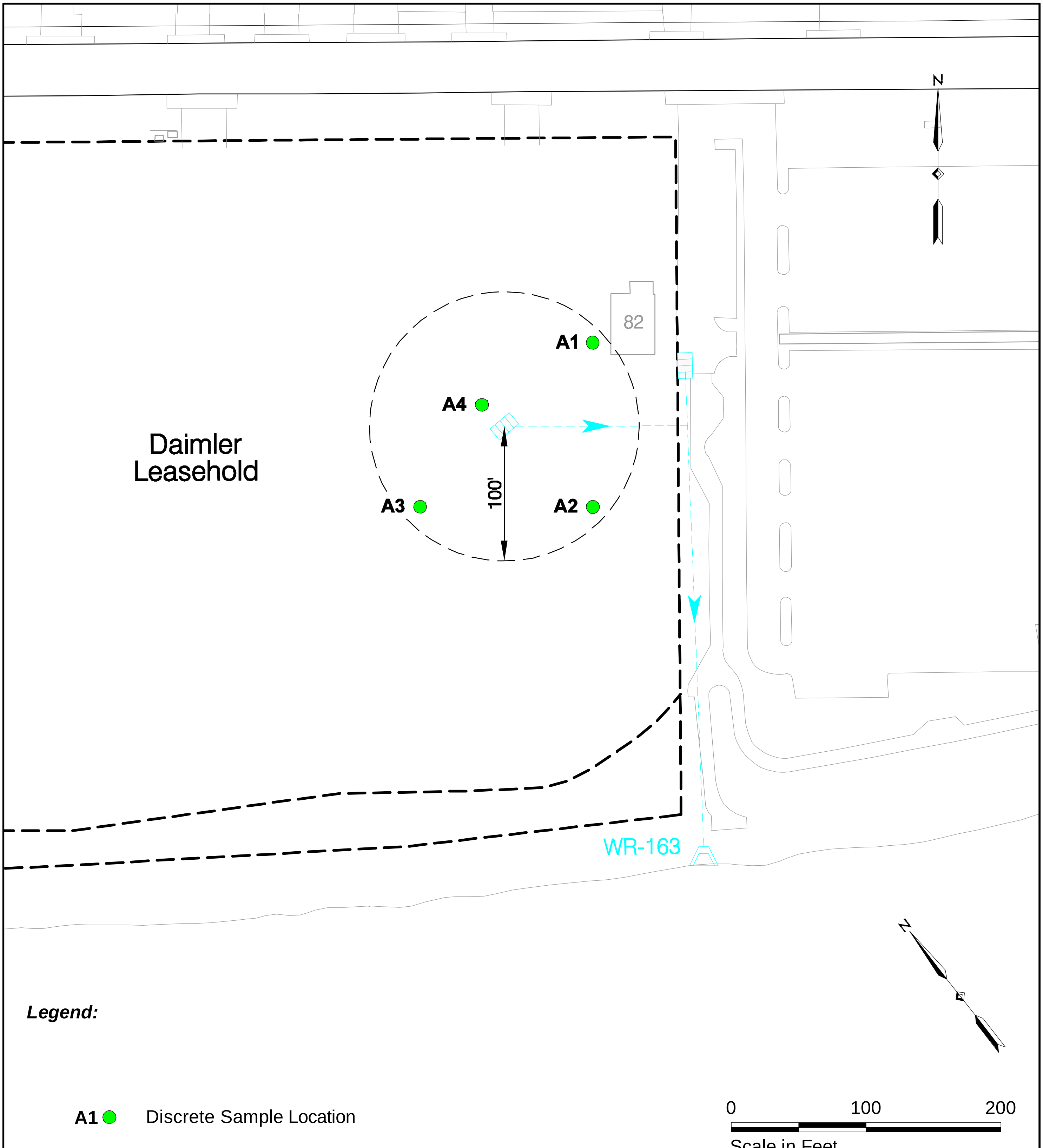
1. Prepared from AutoCAD base map received from the Port of Portland in June 2007.
2. Aerial photograph from from 2010 - Google Imagery. Aerial dated 2008.

Sampling Plan - Substation A

Surface Soil Sampling Letter
Swan Island Upland Facility Operable Unit 2
Portland, Oregon

Ash Creek Associates, Inc.
Environmental and Geotechnical Consultants

Project Number	1115-05	Figure
March 2011		3



Legend:

A1 ● Discrete Sample Location

Catch Basin

WR-163 Outfall Location

Stormwater Line and Flow DIrection

NOTES:

1. Prepared from AutoCAD base map received from the Port of Portland in June 2007.

Sampling Plan - Catch Basin

Surface Soil Sampling Letter
Swan Island Upland Facility Operable Unit 2
Portland, Oregon

Ash Creek Associates, Inc. Environmental and Geotechnical Consultants	Project Number	1115-05	Figure
	March 2011		4

Attachment A

Photograph Log

ATTACHMENT A
PHOTOGRAPH LOG

Project Name: Swan Island Upland Facility, OU2
Project Number: 1115-08

Client: Port of Portland
Location: Portland, Oregon

Photo No: 1

Photo Date: 2/16/2011

Orientation: Northwest

Description:

Composite sampling location beneath the platform observed to have historically included the electrical equipment.

Photo No: 2

Photo Date: 2/16/2011

Orientation: Northeast

Description:

Composite sampling location on the riverbank downslope of the platform. Discrete sampling location in bottom center of photograph and shown on Photograph 3.

ATTACHMENT A
PHOTOGRAPH LOG

Project Name: Swan Island Upland Facility, OU2
Project Number: 1115-08

Client: Port of Portland
Location: Portland, Oregon

Photo No: 3

Photo Date: 2/16/2011

Orientation: Northeast

Description:

Discrete sampling location on the riverbank downslope of the platform.

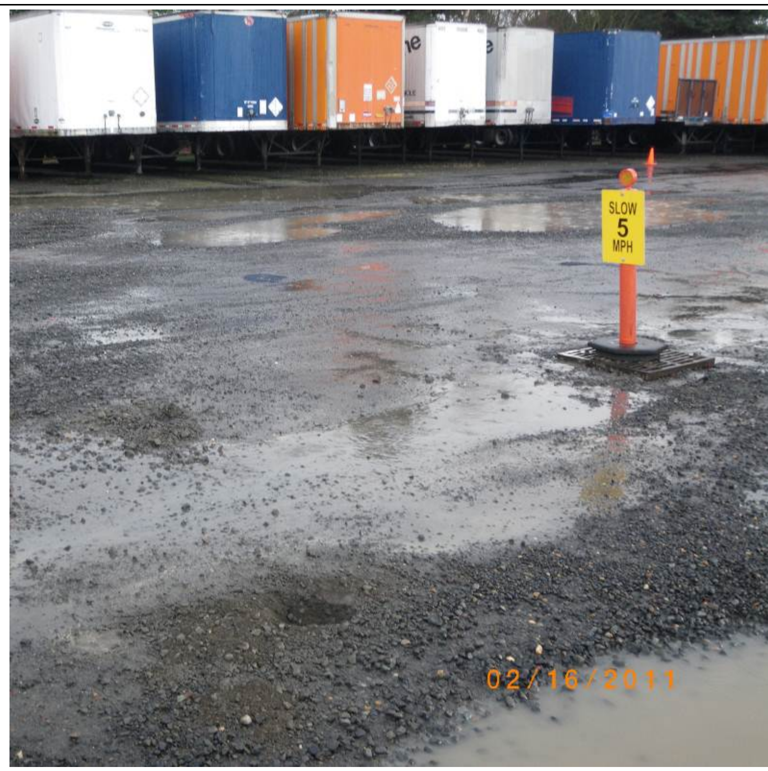
Photo No: 4

Photo Date: 2/16/2011

Orientation: South

Description:

Composite surface soil sample collected from inside a 100-foot radius surrounding the Daimler Lot catch basin on OU2.



Attachment B

Standard Operating Procedures 2.1 and 2.2

1. PURPOSE AND SCOPE

This Standard Operating Procedure (SOP) provides instructions for standard field screening. Field screening results are used to aid in the selection of soil samples for chemical analysis. This procedure is applicable during all Ash Creek Associates (ACA) soil sampling operations.

Standard field screening techniques include the use of a photoionization detector (PID) to assess for volatile organic compounds (VOCs), for the presence of separate-phase petroleum hydrocarbons using a sheen test. These methods will not detect all potential contaminants, so selection of screening techniques shall be based on an understanding of the site history. The PID is not compound or concentration-specific, but it can provide a qualitative indication of the presence of VOCs. PID measurements are affected by other field parameters such as temperature and soil moisture. Other field screening methods, such as screening for dense non-aqueous phase liquid (DNAPL) using dye or UV light, are not considered “standard” and will be detailed in the site-specific sampling and analysis plan (SAP).

2. EQUIPMENT AND MATERIALS

The following materials are necessary for this procedure:

- PID with calibration gas (record daily calibration/calibration check in field notes);
- Plastic resealable bags (for PID measurement); and
- Glass jars or stainless steel bowls (for sheen testing).

3. METHODOLOGY

Each soil sample will be field screened for VOCs using a PID and for the presence of separate-phase petroleum hydrocarbons using a sheen test. If the presence of DNAPL is suspected, then screening using dye and UV light may also to be completed. For information regarding screening using dye or UV light, refer to the site specific sampling and analysis plan.

PID lamps come in multiple sizes, typically 9.8, 10.6, and 11.7 electron volts (eV). The eV rating for the lamp must be greater than the ionization potential (in eV) of a compound in order for the PID to detect the compound. For petroleum hydrocarbons, a lamp of at least 9.8 eV should be used. For typical chlorinated alkenes (dichloroethene, trichloroethene, tetrachloroethene, or vinyl chloride.), a lamp of at least 10.6 eV should be used. The compatibility of the lamp size with the site constituents should be verified prior to the field event and will be detailed in the site-specific SAP.

PID Calibration Procedure: The PID used on-site should be calibrated daily or more frequently if needed. Calibration of the PID should be documented in field notes. Calibrations procedures should be conducted according to the manufacturer’s instructions. .

<u>PID Screening Procedure:</u>

- Place a representative portion (approximately one ounce) of freshly exposed, uncompacted soil into a clean resealable plastic bag.
- Seal the bag and break up the soil to expose vapors from the soil matrix.
- Allow the bag to sit to reach ambient temperature. Note: Ambient temperature and weather conditions/humidity should be recorded in field notes. Changes in ambient temperature and weather during the field work should also be recorded, as temperature and humidity can affect PID readings.
- Carefully insert the intake port of the PID into the plastic bag.
- Record the PID measurement in the field notes or boring logs.

<u>Sheen Test Procedure:</u>

- Following the PID screen, place approximately one ounce of freshly exposed, uncompacted soil into a clean glass jar or stainless steel bowl.

- Add enough water to cover the sample.
- Observe the water surface for signs of discoloration/sheen and characterize

No Sheen (NS)	No visible sheen on the water surface
Biogenic Film (BF)	Dull, platy/blocky or foamy film.
Slight Sheen (SS)	Light sheen with irregular spread, not rapid. May have small spots of color/iridescence. Majority of water surface not covered by sheen.
Moderate Sheen (MS)	Medium to heavy coverage, some color/iridescence, spread is irregular to flowing. Sheen covering a large portion of water surface.
Heavy Sheen (HS)	Heavy sheen coverage with color/iridescence, spread is rapid, entire water surface covered with sheen. Separate-phase hydrocarbons may be evident during sheen test.

1. PURPOSE AND SCOPE

This Standard Operating Procedure (SOP) describes the methods used for obtaining surface soil samples for physical and/or chemical analysis. For purposes of this SOP, surface soil (including shallow subsurface soil) is loosely defined as soil that is present within 3 feet of the ground surface at the time of sampling. Various types of sampling equipment are used to collect surface soil samples including spoons, scoops, trowels, shovels, and hand augers.

2. EQUIPMENT AND MATERIALS

The following materials are necessary for this procedure:

- Spoons, scoops, trowels, shovels, and/or hand augers. Stainless steel is preferred.
- Stainless steel bowls
- Laboratory-supplied sample containers
- Field documentation materials
- Decontamination materials
- Personal protective equipment (as required by Health and Safety Plan)

3. METHODOLOGY

Project-specific requirements will generally dictate the preferred type of sampling equipment used at a particular site. The following parameters should be considered: sampling depth, soil density, soil moisture, use of analyses (e.g., chemical versus physical testing), type of analyses (e.g., volatile versus non-volatile). Analytical testing requirements will indicate sample volume requirements that also will influence the selection of the appropriate type of sampling tool. The project sampling plan should define the specific requirements for collection of surface soil samples at a particular site.

Collection of Samples

- Volatile Analyses. Surface soil sampling for volatile organics analysis (VOA) is different than other routine physical or chemical testing because of the potential loss of volatiles during sampling. To limit volatile loss, the soil sample must be obtained as quickly and as directly as possible. If a VOA sample is to collected as part of a multiple analyte sample, the VOA sample portion will be obtained first. The VOA sample should be obtained from a discrete portion of the entire collected sample and should not be composited or homogenized. Sample bottles should be filled to capacity, with no headspace. Specific procedures for collecting VOA samples using the EPA Method 5035 are discussed in SOP 2-7.
- Other Analyses. Once the targeted sample interval has been collected, the soil sample will be thoroughly homogenized in a stainless steel bowl prior to bottling. Sample homogenizing is accomplished by manually mixing the entire soil sample in the stainless steel bowl with the sampling tool or with a clean teaspoon or spatula until a uniform mixture is achieved. If packing of the samples into the bottles is necessary, a clean stainless steel teaspoon or spatula may be used.

General Sampling Procedure:

- Decontaminate sampling equipment in accordance with the Sampling and Analysis Plan (SAP) before and after each individual soil sample.
- Remove surface debris that blocks access to the actual soil surface or loosen dense surface soils, such as those encountered in heavy traffic areas. If sampling equipment is used to remove surface debris,

the equipment should be decontaminated prior to sampling to reduce the potential for sample interferences.

- When using a hand auger, push and rotate downward until the auger becomes filled with soil. Usually a 6- to 12-inch long core of soil is obtained each time the auger is inserted. Once filled, remove the auger from the ground and empty into a stainless steel bowl. If a VOA sample is required, the sample should be taken directly from the auger using a teaspoon or spatula and/or directly filling the sample container from the auger. Repeat the augering process until the desired sample interval has been augered and placed into the stainless steel bowl.

<u>Backfilling Sample Locations:</u>

Backfill in accordance with federal and state regulations including OAR 690-240 (e.g., bentonite requirements). The soils from the excavation will be used as backfill unless project-specific or state requirements include the use of clean backfill material.

Attachment C

Laboratory Analytical Report (CD-Rom)